

## 6.2 Polynomials and Linear Factors

**Travel** Several popular models of carry-on luggage have a length 10 in. greater than their depth. To comply with airline regulations, the sum of the length, width, and depth may not exceed 40 in.

- a. Assume that the sum of the length, width, and depth is 40 in. Graph the function relating volume  $V$  to depth  $x$ . Find the  $x$ -intercepts. What do they represent?

$$V = \overset{l}{(x+10)} \overset{w}{(40 - (x+10) - x)} \overset{d}{(x)}$$

$40 - x - 10 - x$

$$V = (x+10)(30-2x)(x) \quad \text{Factored form}$$

$$0 = (x+10)(30-2x)(x)$$

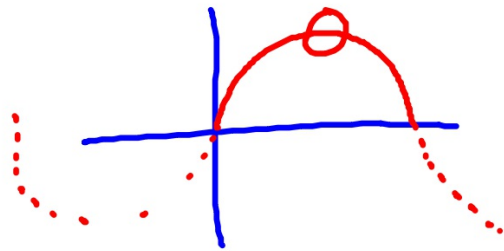
$$0 = x+10 \quad 0 = 30-2x \quad 0 = x$$

$$-10 = x \quad 15 = x \quad 0 = x$$

$$x\text{-min } -15 \quad x\text{-max } 20$$

b. Describe a realistic domain.

$(0, 15)$



c. What is the maximum possible volume of a piece of luggage? What are the corresponding dimensions of the luggage?

$(8.93, 2050)$

$$V = \overset{l}{(x+10)} \overset{w}{(30-2x)} \overset{d}{(x)}$$

$$l = 18.93 \quad w = 12.14 \quad d = 8.93$$